

THE VASCULAR FLORA OF HOPEWELL CULTURE  
NATIONAL HISTORICAL PARK, ROSS COUNTY, OHIO

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**ABSTRACT.** Hopewell Culture National Historical Park, a unit of the United States National Park Service located in Ross County in south central Ohio, was created to restore, protect, and interpret the legacy of the mound building Hopewell prehistoric peoples. The vascular flora of the park had been estimated to be only 20% known prior to the undertaking of this project. During the spring, summer, and fall of 1995, almost 700 plant specimens were collected by three investigators from five units of the park. Totals of 438 species, 281 genera, and 93 families of vascular plants were discovered, representing 40% of the flora of Ross County, and 17% of the flora of Ohio. Introduced species constituted 32% of the flora. Sixty-five species are new records for Ross County. Two species of special concern, *Spiranthes ovalis* and *Eleocharis ovata*, are on the state's threatened and endangered species list. The Hopewell unit had the highest plant diversity of the five units.

**Key Words:** Hopewell, national park, flora, vascular plants

Hopewell Culture National Historical Park is a unit of the United States National Park Service located in Ross County in south central Ohio. It was created to restore, protect, and interpret the legacy of the mound building Hopewell, a group of prehistoric Native American peoples and cultures existing approximately 2,200 to 1,500 years ago. The park is nationally significant because it contains some of the few remaining Hopewell earthworks in the world. However, it also contains areas of land with natural vegetation. Prior to this study, three partial plant checklists and some plant specimens in the park herbarium constituted the knowledge on plant species in the park. As of 1994, about 85 plant species had been recorded in the park and this was estimated to be about 20% of the total probably present (Allison Cusick, Ohio Department of Natural Resources, pers. comm.). This made the park's flora the least known flora of any national park in the midwestern region (Bennett 1996). Recent floristic work in the region includes the flora of unglaciated southeastern Ohio, including Ross County (Cusick and Silberhorn 1977), and a flora of Fort Hill State Memorial in adjacent Highland County (Braun

1969). The current study aimed to increase knowledge of the park's flora with the following goals in mind: (1) to investigate the presence of federally and/or state listed threatened and endangered species, (2) to gain a better understanding of the park's habitats and floristic diversity, (3) to document biodiversity information to assist future park management, and (4) to contribute to the knowledge of Ohio's flora and the floras of parks in the midwestern U.S.

Hopewell Culture park and Ross County are situated on a major dividing line running NE/SW between two phytogeographic regions in Ohio: "... the Miami region, mainly a calcareous, glaciated till plain" to the northwest of the park, and the "... southern non-glaciated area of the Allegheny Plateau" to the southeast (Braun 1989). This latter area contains an older and more relatively undisturbed flora than that of the glaciated area northwest of the park. Because of this phenomenon the flora of central Ross County is likely to be richer than the surrounding areas, assuming that the abiotic environment is fairly constant. However, human disturbances have had major influences on the park's vegetation.

The five units of Hopewell Culture park are High Banks, Hopewell, Hopeton, Mound City, and Seip (Figure 1). In 1995, the designated acreage was 1,134, of which 404 is federal land and the remainder non-federal. The separate units are all located in Ross County with the greatest distance between any two units being approximately 25 miles. Each of the five units is slightly different, and all are described in detail elsewhere (Bennett and Course 1996).

The area occupied by the park has a long history of modern human disturbance. The first park unit, Mound City Group, was originally a military base (the War Department's Camp Sherman) before being transferred to the National Park Service in 1923 by presidential proclamation as a national monument. Barracks and training facilities were removed to restore the mounds. Most of the Hopewell Mound Group unit's land has been farmed at one time and continues to be farmed today. As a historical park, Hopewell Culture's priority has been to protect Hopewell archeological resources. The park's long term objectives include restoring park land to the historic landscape. However, lack of research and funds have impeded that work. In many areas, maintaining hayfields has been the least costly and the least damaging man-

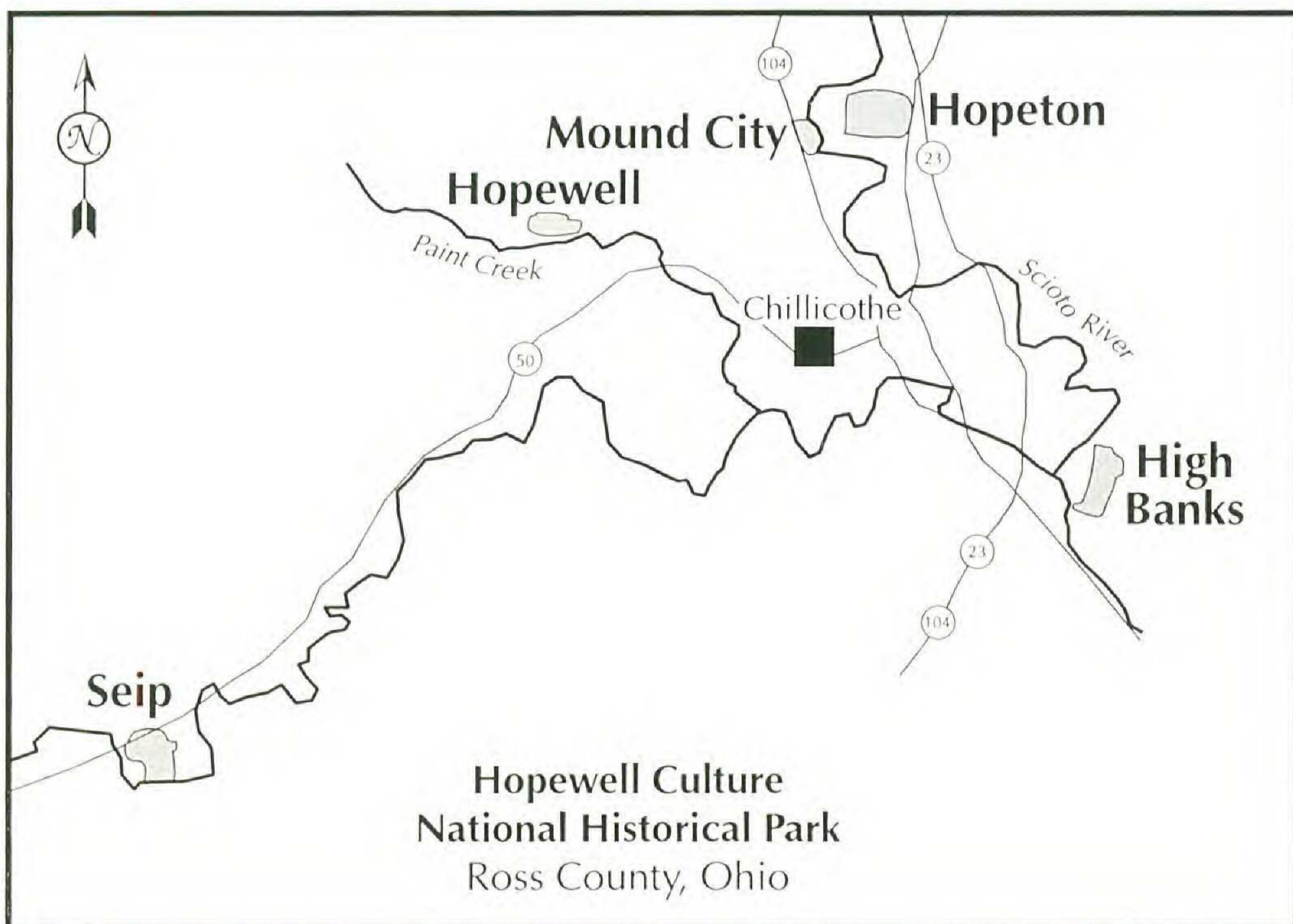


Figure 1. Map of Hopewell Culture National Historical Park (1 cm = approximately 3.5 miles).

agement of the earthworks. Consequently, a large percentage of the park is managed for this habitat.

#### MATERIALS AND METHODS

The taxonomic scope of this survey included all terrestrial and aquatic vascular plants. The field season ran from 15 March 1995 to 13 October 1995. The objective was to collect at least one specimen with reproductive parts of every naturally established plant species occurring within existing and/or proposed park boundaries. The following information was recorded with each specimen: locality, habitat, elevation, and collection date.

Standards for writing floras suggested by Palmer et al. (1995) were adhered to as much as possible for this study. Relative abundance was determined for each species collected, using a three-level abundance scale modified from Palmer et al.'s five rank scale:

Common .....	Dominant or co-dominant in one or more common habitats, or easily seen or found in one or more common habitats but not dominant in any common habitat.
Intermediate .....	Widely scattered but not difficult to find.
Rare .....	Difficult to find with few individuals or colonies but found in several locations, or very difficult to find and limited to one or very few locations or uncommon habitats.

In addition, species presence at other units of the park was noted periodically in order to determine frequency throughout the park. Lastly, the origin (native or introduced) of each species was recorded as determined by Gleason and Cronquist (1991).

Because it was uncertain how much land the park ultimately will purchase from the unacquired Hopewell, Seip, and High Banks units, some acreage was surveyed outside the currently proposed park unit boundaries. However, in some units, land was excluded from the survey because it was still under agriculture. The total acreage surveyed at each site was as follows: High Banks, 8; Hopewell, 247; Hopeton, 155; Mound City, 120; and Seip, 53. The grand total area surveyed was 583 acres. Acreages were estimated from park property maps.

Out of the approximate seven month field season, there were 82 field collecting days, with the majority of them occurring June through September. Size and habitat complexity were primary factors in determining frequency and length of visits to the five different units. The total number of collecting visits to each park unit was the following: High Banks, 7; Hopewell, 34; Hopeton, 29; Mound City, 41; and Seip, 13.

Specimens were identified using the following references: Braun (1967, 1989), Britton and Brown (1970), Catling (1983), Cobb (1963), Cooperrider (1995), Courtenay and Zimmerman (1978), Fisher (1988), Gleason and Cronquist (1991), Hitchcock (1935), Newcomb (1977), Petrides (1972), and Weishaupt (1971). The nomenclature followed for specimen and museum record labels is that of Gleason and Cronquist (1991).

New species for Ross County were determined from the county dot maps in Braun (1967), Cooperrider (1995), Fisher (1988), unpublished maps of J. Furlow, and the county presence data in Cusick and Silberhorn (1977).

## RESULTS

Six hundred and eighty-six specimens representing 438 species were collected for this study (Table 1). Collection numbers for each species are available in Bennett and Course (1996). The voucher specimens were deposited in the park's museum collection at park headquarters and duplicates were deposited at the Ohio State University Herbarium in Columbus (OS). Ten specimens were unidentified.

A floristic summary for the park is shown in Table 2. Almost 80% of the species are dicots. The Hopewell unit had the greatest number of species (348). This was followed by the Mound City unit (268), Hopeton (238), Seip (219), and High Banks (175). These numbers roughly correspond with the acreages of the units. None of the species collected were new to the state of Ohio.

Two species were collected that are on the 1994-95 Ohio Division of Natural Areas and Preserves (1994) Rare Native Ohio Plant List:

*Eleocharis ovata* (Roth) Roemer & Schultes is listed as a state endangered species. Two specimens (JC0147 and JC0385) were found at Hopewell unit along the old logging road in a recently logged area approximately 300 meters east of the northwestern entrance of the forest. They were found in saturated soil near other species of the Cyperaceae. It should be noted that we are using the broad definition of this species according to Gleason and Cronquist (1991), which includes *Eleocharis obtusa* (Willd.) Schultes. Allison Cusick (pers. comm.) considers the specimen to be the latter and quite common throughout the state. *Eleocharis ovata* sensu stricto is quite rare and is found only in the northern part of the state.

*Spiranthes ovalis* Lindl. var. *erostellata* Catling is listed as a potentially threatened species in the state. It was listed formerly as a threatened species but recent findings indicate it may be more frequent in southern Ohio than previously thought (Catling 1983). One specimen (JC0633) was found 20 feet east of the service road in the Mound City unit in an open area of a moist, early successional woods.

Two species in the flora are represented by sight records: *Asparagus officinalis* and *Monotropa uniflora*. *Toxicodendron rad-*

Table 1. Vascular plant species of Hopewell Culture National Historical Park. The list of taxa is sorted first by major group, then alphabetically by family, genus and species. For each species, relative abundance on a three point scale (C = common, I = intermediate, R = rare) and the units of the park the species occurs in (HB = High Banks, HL = Hopewell, HN = Hopeton, MC = Mound City, and SP = Seip) are given. Species preceded by a <sup>1</sup> are new records for Ross County, and those by a <sup>2</sup> are not native.

Taxon	Abundance	Park Units
Pteridophytes		
ADIANTACEAE		
<i>Adiantum pedatum</i> L.	R	HL
ASPLENIACEAE		
<i>Asplenium platyneuron</i> (L.) Oakes	I	HL, MC, SP
<i>Polystichum acrostichoides</i> (Michx.) Schott	R	HL
EQUISETACEAE		
<i>Equisetum arvense</i> L.	R	HL
ONOCLEACEAE		
<i>Onoclea sensibilis</i> L.	R	HL
OPHIOGLOSSACEAE		
<i>Botrychium dissectum</i> Spreng.	R	HL
<i>Botrychium virginianum</i> (L.) Swartz	I	HL, MC
Gymnosperms		
CUPRESSACEAE		
<i>Juniperus virginiana</i> L.	R	HN, MC
Angiosperms		
ACANTHACEAE		
<i>Justicia americana</i> (L.) M. Vahl	R	HB, MC, SP
<i>Ruellia strepens</i> L.	I	HN, HL, MC, SP
ACERACEAE		
<i>Acer negundo</i> L.	C	HB, HN, HL, MC, SP
<i>Acer saccharinum</i> L.	C	HB, HN, HL, MC, SP
<i>Acer saccharum</i> Marshall	C	HB, HN, HL, MC, SP
ALISMATACEAE		
<i>Sagittaria latifolia</i> Willd.	R	MC
AMARANTHACEAE		
<sup>2</sup> <i>Amaranthus retroflexus</i> L.	I	HB, HN, HL
<i>Amaranthus tuberculatus</i> (Moq.) Sauer	R	MC
ANACARDIACEAE		
<i>Rhus glabra</i> L.	I	MC, SP
<i>Rhus typhina</i> L.	I	HN, HL, MC, SP
<i>Toxicodendron radicans</i> (L.) Kuntze	C	HB, HN, HL, MC, SP
ANNONACEAE		
<i>Asimina triloba</i> (L.) Dunal	I	HB, HL, MC, SP

Table 1. Continued.

Taxon	Abundance	Park Units
APIACEAE		
<i>Chaerophyllum procumbens</i> (L.) Crantz	I	HL
<sup>2</sup> <i>Conium maculatum</i> L.	C	HB, HN, HL, MC, SP
<i>Cryptotaenia canadensis</i> (L.) DC.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Daucus carota</i> L.	C	HB, HN, HL, MC, SP
<i>Erigenia bulbosa</i> (Michx.) Nutt.	I	HL
<i>Osmorhiza clatyonii</i> (Michx.) C.B. Clarke	I	HL
<sup>1</sup> <i>Osmorhiza longistylis</i> (Torr.) DC.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Pastinaca sativa</i> L.	C	HB, HN, HL, MC, SP
<i>Sanicula gregaria</i> E. Bickn.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Torilis arvensis</i> (Hudson) Link	I	HB, HN, HL, MC, SP
APOCYNACEAE		
<i>Apocynum cannabinum</i> L.	C	HB, HN, HL, MC, SP
<sup>1,2</sup> <i>Vinca minor</i> L.	I	MC
ARACEAE		
<i>Arisaema triphyllum</i> (L.) Schott	R	HL, MC
ARALIACEAE		
<i>Panax quinquefolius</i> L.	R	HL
ARISTOLOCHIACEAE		
<i>Asarum canadense</i> L.	I	HL, MC, SP
ASCLEPIADACEAE		
<i>Ampelamus albidus</i> (Nutt.) Britton	I	HB, HN, HL, MC, SP
<i>Asclepias incarnata</i> L.	R	HL
<i>Asclepias syriaca</i> L.	C	HB, HN, HL, MC, SP
<i>Asclepias tuberosa</i> L.	R	HN, SP
ASTERACEAE		
<sup>2</sup> <i>Achillea millefolium</i> L.	I	HB, HN, HL, MC, SP
<sup>2</sup> <i>Ambrosia artemisiifolia</i> L.	C	HB, HN, HL, MC, SP
<i>Ambrosia trifida</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Arctium minus</i> Schk.	I	HB, HN, HL, MC, SP
<sup>2</sup> <i>Artemisia annua</i> L.	R	MC
<sup>2</sup> <i>Artemisia vulgaris</i> L.	R	MC
<i>Aster cordifolius</i> L.	I	HN, HL, MC, SP
<i>Aster lanceolatus</i> Willd.	I	HL
<i>Aster lateriflorus</i> (L.) Britton	I	HL
<i>Aster novae-angliae</i> L.	I	HN, HL, MC, SP
<i>Aster pilosus</i> Willd.	C	HB, HN, HL, MC, SP
<i>Aster sagittifolius</i> Willd.	R	HL
<i>Aster shortii</i> Lindley	I	HB, HN, HL, MC, SP
<i>Bidens bipinnata</i> L.	R	HL, MC
<i>Bidens cernua</i> L.	R	HL
<i>Bidens frondosa</i> L.	I	HL, SP
<i>Bidens vulgata</i> Greene	I	HL

Table 1. Continued.

Taxon	Abundance	Park Units
<sup>2</sup> <i>Cacalia atriplicifolia</i> L.	R	SP
<sup>1,2</sup> <i>Carduus nutans</i> L.	R	HN
<sup>2</sup> <i>Chrysanthemum leucanthemum</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Cichorium intybus</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Cirsium arvense</i> (L.) Scop.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Cirsium vulgare</i> (Savi) Tenore	C	HB, HN, HL, MC, SP
<i>Conyza canadensis</i> (L.) Cronq.	C	HB, HN, HL, MC, SP
<i>Echinacea purpurea</i> (L.) Moench	R	MC
<i>Erechtites hieraciifolia</i> (L.) Raf.	I	HL
<i>Erigeron annuus</i> (L.) Pers.	C	HB, HN, HL, MC, SP
<i>Erigeron philadelphicus</i> L.	C	HB, HN, HL, MC, SP
<i>Eupatorium altissimum</i> L.	R	HN
<i>Eupatorium coelestinum</i> L.	I	HL, MC, SP
<i>Eupatorium perfoliatum</i> L.	I	HL
<i>Eupatorium purpureum</i> L.	R	HL
<i>Eupatorium rugosum</i> Houttuyn	C	HB, HN, HL, MC, SP
<sup>1</sup> <i>Eupatorium serotinum</i> Michx.	R	HL
<i>Euthamia graminifolia</i> (L.) Nutt.	I	HB, HL, MC
<sup>1</sup> <i>Gnaphalium obtusifolium</i> L.	I	HB, HN, HL, MC, SP
<i>Helianthus tuberosus</i> L.	C	HB, HN, HL, MC, SP
<i>Heliopsis helianthoides</i> (L.) Sweet	I	HL, SP
<sup>1,2</sup> <i>Hieracium caespitosum</i> Dumort.	I	MC
<i>Kuhnia eupatorioides</i> L.	I	HN, HL
<sup>1</sup> <i>Lactuca canadensis</i> L.	C	HN, HL
<i>Lactuca floridana</i> (L.) Gaertner	C	HN, HL, MC, SP
<sup>2</sup> <i>Lactuca serriola</i> L.	C	HB, HN, HL, MC, SP
<sup>1,2</sup> <i>Matricaria maritima</i> L.	R	HN
<sup>2</sup> <i>Matricaria matricarioides</i> (Less.) Porter	R	MC
<i>Polymnia canadensis</i> L.	C	HL, MC, SP
<i>Ratibida pinnata</i> (Vent.) Barnhart	R	SP
<i>Rudbeckia fulgida</i> Aiton	I	HN, HL
<i>Rudbeckia hirta</i> L.	R	HL, MC, SP
<i>Rudbeckia triloba</i> L.	I	HB, HN, HL, MC
<i>Senecio aureus</i> L.	I	MC
<sup>2</sup> <i>Senecio obovatus</i> Muhl.	R	HN, HL, MC
<i>Silphium perfoliatum</i> L.	I	HN
<i>Solidago canadensis</i> L.	C	HB, HN, HL, MC, SP
<i>Solidago flexicaulis</i> L.	R	HL, SP
<i>Solidago gigantea</i> Aiton	I	HB, HN, HL, MC, SP
<i>Solidago juncea</i> Aiton	I	HN
<i>Solidago rugosa</i> Miller	I	HB, HN, HL, MC, SP
<sup>2</sup> <i>Sonchus asper</i> (L.) Hill	I	HB, HN, HL, MC, SP
<i>Taraxacum officinale</i> Weber ex Wiggers	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Tragopogon pratensis</i> L.	I	HB, HN, HL, MC, SP
<i>Verbesina alternifolia</i> (L.) Britton	C	HB, HN, HL, MC, SP



Table 1. Continued.

Taxon	Abundance	Park Units
<i>Vernonia gigantea</i> (Walter) Trel.	C	HB, HN, HL, MC, SP
<i>Xanthium strumarium</i> L.	I	HL, MC, SP
BALSAMINACEAE		
<sup>2</sup> <i>Impatiens capensis</i> Meerb.	C	HB, HN, HL, MC, SP
<i>Impatiens pallida</i> Nutt.	C	HB, HN, HL, MC, SP
BERBERIDACEAE		
<sup>2</sup> <i>Jeffersonia diphylla</i> (L.) Pers.	I	HL
<i>Podophyllum peltatum</i> L.	I	HL, MC
BETULACEAE		
<i>Carpinus caroliniana</i> Walter	R	SP
<i>Ostrya virginiana</i> (Miller) K. Koch	I	HL, MC, SP
BIGNONIACEAE		
<i>Campsis radicans</i> (L.) Seemann	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Catalpa speciosa</i> Warder	R	HN
BORAGINACEAE		
<sup>2</sup> <i>Echium vulgare</i> L.	R	HB
<i>Hackelia virginiana</i> (L.) I. M. Johnston	I	HL, MC
<sup>2</sup> <i>Lithospermum arvense</i> L.	I	HN, MC
<i>Mertensia virginica</i> (L.) Pers.	I	HL, MC
BRASSICACEAE		
<sup>2</sup> <i>Alliaria petiolata</i> (Bieb.) Cavara & Grande	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Arabidopsis thaliana</i> (L.) Heynh.	I	HN
<i>Arabis perstellata</i> L. Braun	I	SP
<sup>2</sup> <i>Barbarea vulgaris</i> R. Br.	C	HB, HN, HL, MC, SP
<sup>1,2</sup> <i>Berteroa incana</i> (L.) DC.	R	HB
<sup>2</sup> <i>Brassica nigra</i> L.	I	MC
<sup>2</sup> <i>Capsella bursa-pastoris</i> (L.) Medikus	C	HB, HN, HL, MC, SP
<sup>1</sup> <i>Cardamine douglassii</i> Britton	I	HL
<i>Cardamine parviflora</i> L.	I	HN, HL
<sup>2</sup> <i>Draba verna</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Erysimum repandum</i> L.	I	HN, HL
<sup>1,2</sup> <i>Hesperis matronalis</i> L.	I	HN
<i>Iodanthus pinnatifidus</i> (Michx.) Steudel	I	HL, MC, SP
<sup>2</sup> <i>Lepidium campestre</i> (L.) R. Br.	C	HB, HN, HL, MC, SP
<i>Lepidium virginicum</i> L.	I	HB, HN, HL, MC, SP
<sup>2</sup> <i>Rorippa nasturtium-aquaticum</i> (L.) Hayek	R	HB, HN, HL
<sup>2</sup> <i>Sisymbrium officinale</i> (L.) Scop.	I	HB, HN
<sup>2</sup> <i>Thlaspi arvense</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Thlaspi perfoliatum</i> L.	C	HB, HN, HL, MC, SP
CAESALPINIACEAE		
<i>Cercis canadensis</i> L.	C	HB, HN, HL, MC, SP
<i>Gleditsia triacanthos</i> L.	I	HB, HN, HL, MC, SP
<i>Gymnocladus dioica</i> (L.) K. Koch	R	HN, HL, MC

Table 1. Continued.

Taxon	Abundance	Park Units
CAMPANULACEAE		
<i>Campanula americana</i> L.	I	HN, HL, MC, SP
<i>Lobelia inflata</i> L.	I	HB, HN, HL, MC
<i>Lobelia siphilitica</i> L.	I	HN, HL, SP
<i>Triodanis perfoliata</i> (L.) Nieuwl.	I	HB, HN, HL, MC, SP
CANNABACEAE		
<sup>2</sup> <i>Humulus lupulus</i> L.	I	HL, MC
CAPRIFOLIACEAE		
<sup>2</sup> <i>Lonicera japonica</i> Thunb.	C	HB, HN, HL, MC, SP
<sup>1,2</sup> <i>Lonicera maackii</i> (Rupr.) Maxim.	C	HB, HN, HL, MC, SP
<sup>1,2</sup> <i>Lonicera tatarica</i> L.	C	MC
<i>Sambucus canadensis</i> L.	I	HN, HL
<i>Symphoricarpos orbiculatus</i> Moench	I	HL, MC
CARYOPHYLLACEAE		
<sup>2</sup> <i>Cerastium vulgatum</i> L.	I	HN, MC
<sup>2</sup> <i>Dianthus armeria</i> L.	I	HB, HN, HL, MC, SP
<sup>2</sup> <i>Saponaria officinalis</i> L.	C	HB, HN, HL, MC, SP
<i>Silene antirrhina</i> L.	I	HL
<sup>1,2</sup> <i>Silene latifolia</i> Poiret	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Silene noctiflora</i> L.	R	SP
<i>Silene stellata</i> (L.) Aiton f.	R	HL, MC
<i>Silene virginica</i> L.	R	HL
<sup>2</sup> <i>Silene vulgaris</i> (Moench) Garcke	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Stellaria media</i> (L.) Villars	C	HB, HN, HL, MC, SP
CELASTRACEAE		
<i>Celastrus scandens</i> L.	C	HN, HL, MC, SP
<sup>1,2</sup> <i>Euonymus alatus</i> (Thunb.) Siebold	R	MC
<i>Euonymus atropurpureus</i> Jacq.	I	HB, HN, HL, MC, SP
CHENOPODIACEAE		
<sup>2</sup> <i>Chenopodium album</i> L.	C	HB, HN, HL, MC, SP
CLUSIACEAE		
<i>Hypericum mutilum</i> L.	R	HL
<sup>2</sup> <i>Hypericum perforatum</i> L.	I	HB, HN, HL, MC
<i>Hypericum punctatum</i> Lam.	I	HL
COMMELINACEAE		
<sup>2</sup> <i>Commelina communis</i> L.	I	HB, HN, HL, SP
CONVOLVULACEAE		
<sup>2</sup> <i>Calystegia sepium</i> (L.) R. Br.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Convolvulus arvensis</i> L.	I	HB, HL, MC
<sup>2</sup> <i>Ipomoea hederacea</i> Jacq.	I	HB, HN, HL, MC, SP
<i>Ipomoea lacunosa</i> L.	I	HB, HN
<i>Ipomoea pandurata</i> (L.) G. Meyer	C	HB, HN, HL, MC, SP

Table 1. Continued.

Taxon	Abundance	Park Units
CORNACEAE		
<i>Cornus drummondii</i> C. A. Meyer	R	HB, HN, MC
<i>Cornus florida</i> L.	I	HB, HN, HL, MC, SP
CUCURBITACEAE		
<sup>1</sup> <i>Cucurbita pepo</i> L.	R	HN
<i>Sicyos angulatus</i> L.	R	MC
CYPERACEAE		
<sup>1</sup> <i>Carex albicans</i> Willd.	I	HL
<i>Carex albursina</i> Sheldon	R	HL
<sup>1</sup> <i>Carex amphibola</i> Steudel	R	HL, MC
<sup>1</sup> <i>Carex blanda</i> Dewey	R	HL
<sup>1</sup> <i>Carex careyana</i> Torr.	R	HL
<i>Carex davisii</i> Schwein. & Torr.	R	HL
<i>Carex festucacea</i> Schk.	R	HL
<sup>1</sup> <i>Carex flaccosperma</i> Dewey	R	HL
<sup>1</sup> <i>Carex gracillima</i> Schwein.	R	HL
<i>Carex hirtifolia</i> Mackenzie	R	HL
<i>Carex jamesii</i> Schwein.	R	HL
<sup>1</sup> <i>Carex laxiculmis</i> Schwein.	R	HL
<sup>1</sup> <i>Carex retroflexa</i> Muhl.	R	SP
<i>Carex rosea</i> Schk.	R	HL
<sup>1</sup> <i>Carex shortiana</i> Dewey	R	HL
<sup>1</sup> <i>Carex squarrosa</i> L.	I	HN, HL
<i>Carex stipata</i> Muhl.	I	HN, HL
<sup>1</sup> <i>Carex vulpinoidea</i> Michx.	R	HL
<i>Cyperus esculentus</i> L.	I	HL
<i>Eleocharis ovata</i> (Roth) Roemer & Schultes	R	HL
<i>Scirpus atrovirens</i> Willd.	I	HL
<i>Scirpus lineatus</i> Michx.	R	HL
DIPSACACEAE		
<sup>2</sup> <i>Dipsacus sylvestris</i> Hudson	C	HB, HN, HL, MC, SP
ELAEAGNACEAE		
<sup>1,2</sup> <i>Elaeagnus angustifolia</i> L.	R	HN, HL
EUPHORBIACEAE		
<i>Acalypha rhomboidea</i> Raf.	I	HN, HL, MC
<i>Acalypha virginica</i> L.	R	HL
<i>Euphorbia commutata</i> Engelm.	R	HL
<i>Euphorbia dentata</i> Michx.	R	MC
<i>Euphorbia maculata</i> L.	C	HB, HN, HL, MC, SP
FABACEAE		
<i>Amphicarpaea bracteata</i> (L.) Fern.	R	HL, SP
<i>Desmodium canescens</i> (L.) DC.	I	HN, HL, MC, SP

Table 1. Continued.

Taxon	Abundance	Park Units
<sup>1</sup> <i>Desmodium nudiflorum</i> (L.) DC.	R	HL
<sup>2</sup> <i>Medicago lupulina</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Medicago sativa</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Melilotus alba</i> Medikus	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Melilotus officinalis</i> (L.) Pallas	C	HB, HN, HL, MC, SP
<i>Robinia pseudoacacia</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Trifolium campestre</i> Schreb.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Trifolium hybridum</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Trifolium incarnatum</i> L.	R	HN
<sup>2</sup> <i>Trifolium pratense</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Vicia cracca</i> L.	I	HN
FAGACEAE		
<i>Fagus grandifolia</i> Ehrh.	R	HL
<i>Quercus alba</i> L.	I	HN, HL, MC
<i>Quercus bicolor</i> Willd.	I	HL, MC
<i>Quercus imbricaria</i> Michx.	R	HL, MC
<sup>2</sup> <i>Quercus macrocarpa</i> Michx.	R	HL, MC, SP
<i>Quercus muehlenbergii</i> Engelm.	I	HL, SP
<i>Quercus rubra</i> L.	I	HB, HN, HL, MC, SP
FUMARIACEAE		
<i>Corydalis flavula</i> (Raf.) DC.	I	MC
<i>Dicentra cucullaria</i> (L.) Bernh.	R	HL, MC
GERANIACEAE		
<i>Geranium carolinianum</i> L.	C	HB, HN, HL, MC, SP
<i>Geranium maculatum</i> L.	I	HL, MC
HAMAMELIDACEAE		
<i>Hamamelis virginiana</i> L.	R	MC
<sup>1</sup> <i>Liquidambar styraciflua</i> L.	I	HN, HL, MC, SP
HIPPOCASTANACEAE		
<i>Aesculus glabra</i> Willd.	I	HB, HL, MC, SP
HYDROPHYLLACEAE		
<i>Hydrophyllum appendiculatum</i> Michx.	I	HL
<sup>2</sup> <i>Phacelia purshii</i> Buckley	I	HN, HL
IRIDACEAE		
<i>Sisyrinchium angustifolium</i> Miller	I	HL
JUGLANDACEAE		
<i>Carya cordiformis</i> (Wangenh.) K. Koch	R	HL
<i>Carya ovata</i> (Miller) K. Koch	I	HN, HL
<i>Juglans nigra</i> L.	C	HB, HN, HL, MC, SP
JUNCACEAE		
<sup>2</sup> <i>Juncus tenuis</i> Willd.	R	HN, HL
<i>Juncus torreyi</i> Cov.	R	HL
<i>Luzula multiflora</i> (Retz.) Lej.	I	HL

Table 1. Continued.

Taxon	Abundance	Park Units
LAMIACEAE		
<sup>2</sup> <i>Agastache nepetoides</i> (L.) Kuntze	R	HL
<i>Blephilia hirsuta</i> (Pursh) Benth.	I	HL
<sup>2</sup> <i>Glechoma hederacea</i> L.	C	HB, HN, HL, MC, SP
<i>Hedeoma pulegioides</i> (L.) Pers.	R	HL
<sup>1</sup> <i>Lamium album</i> L.	R	MC
<sup>2</sup> <i>Lamium amplexicaule</i> L.	I	HN, MC
<sup>2</sup> <i>Lamium purpureum</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Leonurus cardiaca</i> L.	I	HB, HN, HL, MC, SP
<i>Lycopus americanus</i> Muhl.	R	HL
<i>Monarda fistulosa</i> L.	I	HN, MC
<sup>2</sup> <i>Nepeta cataria</i> L.	R	HB, SP
<i>Prunella vulgaris</i> L.	I	HB, HN, HL, MC, SP
<i>Teucrium canadense</i> L.	C	HB, HN, HL, MC
LAURACEAE		
<i>Sassafras albidum</i> (Nutt.) Nees	I	HN, HL, MC, SP
LENTIBULARIACEAE		
<sup>1</sup> <i>Utricularia gibba</i> L.	R	HL
LILIACEAE		
<sup>1</sup> <i>Allium cernuum</i> Roth	C	HB, HN, HL, MC, SP
<sup>1</sup> <i>Allium tricoccum</i> Aiton	R	HL, SP
<sup>1,2</sup> <i>Allium vineale</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Asparagus officinalis</i> L.	I	HN, MC
<i>Camassia scilloides</i> (Raf.) Cory	R	HL, SP
<sup>1</sup> <i>Erythronium albidum</i> Nutt.	I	HL
<sup>1,2</sup> <i>Hemerocallis fulva</i> (L.) L.	I	HN, HL, SP
<sup>1</sup> <i>Lilium canadense</i> L.	R	SP
<sup>1,2</sup> <i>Ornithogalum umbellatum</i> L.	C	HB, HN, HL, MC, SP
<i>Polygonatum biflorum</i> (Walter) Elliott	R	HN, HL, MC
<i>Smilacina racemosa</i> (L.) Desf.	I	HL, MC, SP
<i>Trillium sessile</i> L.	I	HL
<i>Uvularia grandiflora</i> J. E. Smith	R	MC
MAGNOLIACEAE		
<i>Liriodendron tulipifera</i> L.	I	MC, SP
MALVACEAE		
<sup>2</sup> <i>Abutilon theophrasti</i> Medikus	R	HN, MC
<sup>1,2</sup> <i>Hibiscus trionum</i> L.	R	SP
<sup>1,2</sup> <i>Malva rotundifolia</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Sida spinosa</i> L.	I	HB, HN, HL, MC
MENISPERMACEAE		
<i>Menispermum canadense</i> L.	C	HB, HN, HL, MC, SP
MONOTROPACEAE		
<i>Monotropa uniflora</i> L.	R	HL

Table 1. Continued.

Taxon	Abundance	Park Units
MORACEAE		
<sup>2</sup> <i>Maclura pomifera</i> (Raf.) Schneid.	R	HN, MC
<sup>2</sup> <i>Morus alba</i> L.	C	HB, HN, HL, MC, SP
<i>Morus rubra</i> L.	I	HB, HN, HL, MC, SP
NYCTAGINACEAE		
<i>Mirabilis nyctaginea</i> (Michx.) MacMillan	I	HN, MC
OLEACEAE		
<i>Fraxinus americana</i> L.	C	HB, HN, HL, MC, SP
<i>Fraxinus pennsylvanica</i> Marshall	C	HB, HN, HL, MC, SP
<i>Fraxinus quadrangulata</i> Michx.	R	HL
<sup>1,2</sup> <i>Ligustrum vulgare</i> L.	R	MC
ONAGRACEAE		
<i>Circaea lutetiana</i> L.	I	HL
<sup>1</sup> <i>Epilobium glandulosum</i> Lehm.	R	HL
<i>Gaura biennis</i> L.	I	HN, MC
<i>Oenothera biennis</i> L.	I	HN, HL, MC
<i>Oenothera perennis</i> L.	R	HN, HL
ORCHIDACEAE		
<sup>1</sup> <i>Aplectrum hyemale</i> (Muhl.) Torr.	R	HL
<sup>1</sup> <i>Spiranthes ovalis</i> Lindl.	R	MC
OXALIDACEAE		
<i>Oxalis stricta</i> L.	C	HB, HN, HL, MC, SP
<i>Oxalis violacea</i> L.	R	HL
PAPAVERACEAE		
<sup>2</sup> <i>Papaver dubium</i> L.	R	HN
<sup>2</sup> <i>Sanguinaria canadensis</i> L.	I	HL
PHYTOLACCACEAE		
<i>Phytolacca americana</i> L.	C	HB, HN, HL, MC, SP
PLANTAGINACEAE		
<sup>2</sup> <i>Plantago lanceolata</i> L.	C	HB, HN, HL, MC, SP
<sup>1,2</sup> <i>Plantago major</i> L.	C	HB, HN, HL, MC, SP
PLATANACEAE		
<sup>2</sup> <i>Platanus occidentalis</i> L.	I	HB, HN, HL, MC, SP
POACEAE		
<sup>1</sup> <i>Agrostis hyemalis</i> (Walter) BSP.	R	SP
<i>Andropogon gerardii</i> Vitman	I	SP
<sup>2</sup> <i>Bromus commutatus</i> Schrader	I	HB, HN, HL, MC, SP
<sup>1,2</sup> <i>Bromus inermis</i> Leysser	C	MC
<sup>2</sup> <i>Bromus tectorum</i> L.	I	HN, MC
<i>Chasmanthium latifolium</i> (Michx.) Yates	R	SP
<sup>1</sup> <i>Cinna arundinacea</i> L.	I	HB, HN, HL, MC, SP
<sup>2</sup> <i>Dactylis glomerata</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Digitaria sanguinalis</i> (L.) Scop.	I	HB, HN, HL, MC, SP

Table 1. Continued.

Taxon	Abundance	Park Units
<sup>2</sup> <i>Echinochloa crusgalli</i> (L.) P. Beauv.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Eleusine indica</i> (L.) Gaertn.	I	HB, HN, HL, MC, SP
<sup>1</sup> <i>Elymus canadensis</i> L.	C	HB, HN, HL, MC, SP
<i>Elymus hystrix</i> L.	I	HB, HN, HL, MC, SP
<i>Elymus villosus</i> Muhl.	I	HN, HL
<sup>1,2</sup> <i>Elytrigia repens</i> (L.) Nevski	C	HB, HN, HL, MC, SP
<sup>1</sup> <i>Eragrostis capillaris</i> (L.) Nees	I	HL
<sup>1,2</sup> <i>Festuca elatior</i> L.	C	HB, HN, HL, MC, SP
<sup>1,2</sup> <i>Festuca ovina</i> L.	R	SP
<sup>1</sup> <i>Festuca subverticillata</i> (Pers.) E. Alexeev	I	HN, HL, MC, SP
<i>Glyceria striata</i> (Lam.) A. Hitchc.	R	HL
<i>Leersia virginica</i> Willd.	I	HL, MC
<sup>2</sup> <i>Muhlenbergia schreberi</i> J. F. Gmelin	I	HN, HL, MC, SP
<i>Panicum capillare</i> L.	I	HB, HN, HL, MC, SP
<i>Panicum dichotomiflorum</i> Michx.	I	HB, HL
<i>Panicum lanuginosum</i> Elliott	I	HB, HN, HL, MC, SP
<sup>1</sup> <i>Panicum latifolium</i> L.	I	HL, SP
<i>Panicum virgatum</i> L.	I	HN, HL, SP
<sup>2</sup> <i>Phleum pratense</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Poa pratensis</i> L.	I	HB, HN, HL, MC, SP
<i>Poa sylvestris</i> A. Gray	I	MC
<sup>1,2</sup> <i>Setaria faberi</i> R. Herrm.	I	HN, HL, MC, SP
<sup>2</sup> <i>Setaria glauca</i> (L.) P. Beauv.	C	HB, HN, HL, MC, SP
<sup>1,2</sup> <i>Setaria italica</i> (L.) P. Beauv.	I	HL
<sup>2</sup> <i>Setaria viridis</i> (L.) P. Beauv.	C	HB, HN, HL, MC, SP
<i>Sorghastrum nutans</i> (L.) Nash	I	HL, SP
<sup>2</sup> <i>Sorghum halepense</i> (L.) Pers.	C	HB, HN, HL, MC, SP
<i>Tridens flavus</i> (L.) A. Hitchc.	C	HB, HN, HL, MC, SP
POLEMONIACEAE		
<i>Phlox divaricata</i> L.	I	HL
<i>Phlox paniculata</i> L.	I	MC, SP
<i>Polemonium reptans</i> L.	I	HL
POLYGONACEAE		
<sup>2</sup> <i>Polygonum aviculare</i> L.	C	HB, HN, HL, MC, SP
<i>Polygonum cespitosum</i> Blume	I	HL
<i>Polygonum pensylvanicum</i> L.	I	HB, HN, HL, MC, SP
<sup>2</sup> <i>Polygonum persicaria</i> L.	C	HN, HL, MC
<i>Polygonum punctatum</i> Elliott	I	MC
<sup>2</sup> <i>Polygonum scandens</i> L.	I	HB, HN, HL
<i>Polygonum virginianum</i> L.	I	HL, MC
<sup>2</sup> <i>Rumex acetosella</i> L.	I	HB, SP
<sup>2</sup> <i>Rumex crispus</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Rumex obtusifolius</i> L.	I	HN, HL
<i>Rumex verticillatus</i> L.	I	MC

Table 1. Continued.

Taxon	Abundance	Park Units
PORTULACACEAE		
<i>Claytonia virginica</i> L.	C	HB, HN, HL, MC, SP
POTAMOGETONACEAE		
<i>Potamogeton nodosus</i> Poir.	R	HL
PRIMULACEAE		
<i>Lysimachia ciliata</i> L.	R	MC
<sup>2</sup> <i>Lysimachia nummularia</i> L.	C	HB, HN, HL, MC, SP
<i>Samolus floribundus</i> HBK.	R	HL
RANUNCULACEAE		
<i>Actaea alba</i> (L.) Miller	R	HL
<i>Anemone virginiana</i> L.	I	HL, MC, SP
<i>Anemonella thalictroides</i> (L.) Spach	I	HL, MC
<i>Aquilegia canadensis</i> L.	R	HL, MC
<i>Clematis viorna</i> L.	R	HL
<i>Clematis virginiana</i> L.	I	HN, HL
<i>Delphinium tricorne</i> Michx.	I	HL
<i>Hydrastis canadensis</i> L.	R	HL
<i>Ranunculus abortivus</i> L.	C	HB, HN, HL, MC, SP
<i>Ranunculus hispidus</i> Michx.	I	HL
<sup>2</sup> <i>Ranunculus micranthus</i> Nutt.	R	HL
<i>Thalictrum revolutum</i> DC.	R	SP
ROSACEAE		
<i>Agrimonia gryposepala</i> Wallr.	I	HL, SP
<i>Agrimonia parviflora</i> Aiton	R	HL, SP
<i>Crataegus coccinea</i> L.	I	HB, MC, SP
<i>Crataegus crus-galli</i> L.	R	MC
<i>Crataegus punctata</i> Jacq.	R	HL
<sup>2</sup> <i>Duchesnea indica</i> (Andrews) Focke	I	HL, MC
<i>Fragaria virginiana</i> Duchesne	I	HL
<i>Geum canadense</i> Jacq.	C	HB, HN, HL, MC, SP
<i>Geum vernum</i> (Raf.) T. & G.	I	HL
<i>Physocarpus opulifolius</i> (L.) Maxim.	R	SP
<sup>2</sup> <i>Potentilla norvegica</i> L.	I	HB, HN
<sup>2</sup> <i>Potentilla recta</i> L.	I	HB, HN, HL, MC, SP
<sup>1,2</sup> <i>Prunus mahaleb</i> L.	R	MC
<i>Prunus serotina</i> Ehrh.	I	HB, HL, MC
<i>Pyrus malus</i> L.	R	HL
<sup>1,2</sup> <i>Rhodotypos scandens</i> (Thunb.) Makino	R	MC
<sup>2</sup> <i>Rosa multiflora</i> Thunb.	C	HB, HN, HL, MC, SP
<i>Rosa setigera</i> Michx.	R	HN, HL
<i>Rubus allegheniensis</i> T. C. Porter	I	HB, HN, HL, MC, SP
<i>Rubus occidentalis</i> L.	C	HB, HN, HL, MC, SP
<sup>1</sup> <i>Rubus pensilvanicus</i> Poiret	I	HB, HN, HL, MC, SP



Table 1. Continued.

Taxon	Abundance	Park Units
RUBIACEAE		
<i>Galium aparine</i> L.	C	HB, HN, HL, MC, SP
<i>Galium circaezans</i> Michx.	I	HL, SP
<i>Galium concinnum</i> T. & G.	I	HL
<sup>2</sup> <i>Galium mollugo</i> L.	I	HL
RUTACEAE		
<i>Ptelea trifoliata</i> L.	R	HL, MC, SP
SALICACEAE		
<i>Populus deltoides</i> Marshall	I	HB, HN, HL, MC, SP
<i>Salix nigra</i> Marshall	C	HB, HN, HL, MC, SP
SAXIFRAGACEAE		
<i>Penthorum sedoides</i> L.	R	HL
SCROPHULARIACEAE		
<i>Dasistoma macrophylla</i> (Nutt.) Raf.	R	HL
<sup>1</sup> <i>Mimulus alatus</i> Aiton	I	HL
<i>Penstemon digitalis</i> Nutt.	I	HN, HL
<i>Penstemon hirsutus</i> (L.) Willd.	I	HN, HL, MC
<i>Scrophularia marilandica</i> L.	R	SP
<sup>2</sup> <i>Verbascum blattaria</i> L.	I	HN, HL, MC
<sup>2</sup> <i>Verbascum thapsus</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Veronica arvensis</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Veronica officinalis</i> L.	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Veronica persica</i> Poir.	C	HB, HN, HL, MC, SP
<i>Veronica serpyllifolia</i> L.	I	HB, HN, HL, MC, SP
SIMAROUBACEAE		
<sup>2</sup> <i>Ailanthus altissima</i> (Miller) Swingle	I	HN, MC, SP
SMILACACEAE		
<sup>1</sup> <i>Smilax ecirrhata</i> (Engelm.) S. Wats.	I	HB, HN, HL, MC, SP
<i>Smilax rotundifolia</i> L.	I	HB, HN, HL, MC, SP
SOLANACEAE		
<i>Datura stramonium</i> L.	I	HN, HL
<sup>1,2</sup> <i>Petunia</i> × <i>hybrida</i> Vilm.	R	MC
<i>Physalis heterophylla</i> Nees	C	HB, HN, HL, MC, SP
<i>Physalis longifolia</i> Nutt.	R	HL
<sup>2</sup> <i>Solanum carolinense</i> L.	C	HB, HN, HL, MC, SP
<i>Solanum nigrum</i> L.	I	HL, MC
TILIACEAE		
<i>Tilia americana</i> L.	I	HB, HL, MC, SP
TYPHACEAE		
<i>Typha latifolia</i> L.	I	HL
ULMACEAE		
<i>Celtis occidentalis</i> L.	C	HB, HN, HL, MC, SP
<i>Ulmus americana</i> L.	R	HN

Table 1. Continued.

Taxon	Abundance	Park Units
<sup>1,2</sup> <i>Ulmus pumila</i> L.	I	HN, MC
<i>Ulmus rubra</i> Muhl.	C	HB, HN, HL, MC, SP
URTICACEAE		
<i>Boehmeria cylindrica</i> (L.) Swartz	I	HB, HN, HL, MC, SP
<i>Laportea canadensis</i> (L.) Wedd.	I	HB, HN, MC
<i>Pilea pumila</i> (L.) A. Gray	C	HB, HN, HL, MC, SP
<i>Urtica dioica</i> L.	I	HN, HL, MC
VALERIANACEAE		
<i>Valerianella chenopodifolia</i> (Pursh) DC.	I	HN, MC
<sup>2</sup> <i>Valerianella locusta</i> (L.) Betcke	I	MC
VERBENACEAE		
<i>Phryma leptostachya</i> L.	R	HL, MC, SP
<i>Verbena hastata</i> L.	R	HN
<i>Verbena urticifolia</i> L.	I	HB, HN, HL, MC, SP
VIOLACEAE		
<i>Viola palmata</i> L.	R	HL
<i>Viola pubescens</i> Aiton	I	HL
<i>Viola rafinesquii</i> Greene	I	HN, MC
<i>Viola sororia</i> Willd.	C	HB, HN, HL, MC, SP
<i>Viola striata</i> Aiton	I	HL, SP
VITACEAE		
<i>Parthenocissus quinquefolia</i> (L.) Planchon	C	HB, HN, HL, MC, SP
<sup>2</sup> <i>Vitis aestivalis</i> Michx.	I	HN, MC, SP
<sup>1</sup> <i>Vitis riparia</i> Michx.	C	HB, HN, HL, MC, SP
<i>Vitis vulpina</i> L.	I	HB, HN, HL, MC, SP

Table 2. Floristic summary of plant taxa of Hopewell Culture National Historical Park.

Group	Families	Genera	Species		
			Native	Introduced	Total
Pteridophytes	5	6	7	0	7
Gymnosperms	1	1	1	0	1
Angiosperms					
Dicots	75	225	228	116	344
Monocots	12	49	61	25	86
Total	93	281	297	141	438

*icans* was documented by a specimen collected by C. Roth in 1976, which was found in the park herbarium.

Three unpublished plant lists compiled by C. Roth, A. Shoemaker, and J. McMahon were found at the park and reviewed. Some species on these lists were not found during the 1995 field season, and may or may not occur in the park. These species were not included on the park list: *Allium canadense* L., *Allium stellatum* Ker Gawler, *Arabis hirsuta* (L.) Scop., *Brassica rapa* L., *Cardamine concatenata* (Michx.) O. Schwarz, *Carya tomentosa* (Poiret) Nutt., *Cirsium altissimum* (L.) Sprengel, *Eupatorium fistulosum* Barratt, *Geranium bicknellii* Britton, *Geranium pusillum* L., *Geum virginianum* L., *Matelea obliqua* (Jacq.) Woodson, *Paulownia tomentosa* (Thunb.) Steudel, *Potentilla simplex* Michx., *Rubus hispidus* L., *Rubus villosus* (presumably *Rubus flagellaris* Willd.), *Rudbeckia laciniata* L., *Saxifraga bronchialis* L., *Solanum rostratum* Dunal, *Stellaria graminea* L., *Trifolium aureum* Pollich, *Trifolium repens* L., *Verbena stricta* Vent., *Veronica filiformis* J. E. Smith, *Viola blanda* Willd., and *Zizia* sp.

The following species were determined to be planted and not reproducing and are, therefore, not included on the park list: *Acer rubrum* L., *Aesculus hippocastanum* L., *Albizia julibrissin* Durazz., *Berberis thunbergii* DC., *Broussonetia papyrifera* (L.) Vent., *Fraxinus excelsior* L., *Hibiscus syriacus* L., *Koelreuteria paniculata* Laxm., *Philadelphus inodorus* L., *Philadelphus pubescens* Loisel., *Picea abies* (L.) Karst., *Pinus nigra* Arnold, *Pinus resinosa* Aiton, *Pinus strobus* L., *Quercus coccinea* Muenchh., *Quercus palustris* Muenchh., *Syringa vulgaris* L., *Thuja occidentalis* L., *Triticum aestivum* L., and *Viburnum opulus* L.

Some specimens were identified to the variety level. These typically are excluded from floras because of their uncertain taxonomic status. The species, however, are included in the park list. They include *Acer negundo* var. *negundo*, *Aster lanceolatus* var. *simplex* (Willd.) A. G. Jones, *Aster pilosus* var. *pilosus*, *Cardamine parviflora* var. *arenicola* (Britt.) O. E. Schulz, *Carex albicans* var. *albicans*, *Cercis canadensis* var. *canadensis*, *Chaerophyllum procumbens* var. *shortii* T. & G., *Cirsium arvense* var. *horridum* Wimmer & Graebner, *Conyza canadensis* var. *canadensis*, *Erechtites hieraciifolia* var. *hieraciifolia*, *Eupatorium rugosum* var. *rugosum*, *Fraxinus americana* var. *americana*, *Fraxinus pennsylvanica* var. *subintegerrima* (Vahl) Fern., *Fraxinus pennsylvanica* var. *pennsylvanica*, *Heliopsis helianthoides* var. *scabra*

(Dunal) Fern., *Humulus lupulus* var. *pubescens* E. Small, *Physalis longifolia* var. *subglabrata* (Mackenzie & Bush) Cronq., *Polygonum reptans* var. *villosum* E. Braun, *Polygonum cespitosum* var. *longisetum* (De Bruyn) Stewart, *Polygonum scandens* var. *dumetorum* (L.) Gleason, *Prunella vulgaris* var. *lanceolata* (Barton) Fern., *Rudbeckia hirta* var. *pulcherrima* Farw., *Sagittaria latifolia* var. *latifolia*, *Solanum nigrum* var. *virginicum* L., *Solidago gigantea* var. *leiophylla* Fern., *Spiranthes ovalis* var. *eros-tellata* Catling, *Urtica dioica* var. *procera* (Muhl.) Wedd., *Vernonia gigantea* var. *gigantea*, and *Vitis aestivalis* var. *aestivalis*.

#### DISCUSSION

Park managers often need to know how a park's flora relates to the flora of the region in which the park occurs. This adds to our knowledge of how well parks represent the flora of a region and how much the region's flora is protected. In the case of Hopewell Culture, even though the park is small in area, the total number of taxa represents 40% of the species, 57% of the genera, and 76% of the families of Ross County, which is fairly good representation. Even more remarkable is the representation of the flora of Ohio: 17% of the species, 35% of the genera, and 56% of the families. Either the park is unusually rich for its size, or other comparably sized areas are being undersampled. Before this study was undertaken, the plant checklist for the park totaled 86 species, and this was estimated to be 20% of the total flora (A. Cusick, pers. comm.). This survey resulted in a total of 438 species, and the 86 species recorded before the study are exactly 20% of this total, suggesting that Cusick's estimate was quite accurate and the park's flora is not unusually rich.

It is worth noting that introduced species constitute 32% of the total number at the park. This is relatively high, but similar to other parks in the midwestern U.S. (Bennett 1996).

Published floras are usually never 100% complete because future collecting typically will discover more species. Although the collection effort for this study was fairly intensive, some species probably remain to be discovered. The species that are missing are probably a combination of the following:

- Spring ephemerals—this part of the flora was undersampled in three units, and not sampled at all in High Banks and Seip

- Grasses and sedges—these are difficult groups to sample
- Unidentified specimens (about 10)
- Species from earlier lists that were not found in this survey

Future field work should concentrate on these groups in order to complete the flora.

Although many national parks in the midwestern U.S. have fairly complete floras (80% known or more; Bennett 1996), many other parks across the country still need floristic studies. More such work is needed as parks become increasingly isolated in a man-made landscape. This study could serve as a model for floristic surveys of national parks in the future.

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